Study of the ^{48}Ca + ^{249}Bk fusion reaction leading to element Z = 117: long-lived α-decaying ^{270}Db and discovery of ^{266}Lr *

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The fusion-evaporation reaction ^{48}Ca + ^{249}Bk, was studied at the gas-filled TransActinide Separator and Chemistry Apparatus (TASCA) [1], which was significantly upgraded [2] now being able to register nuclei with half-lives from sub-μs to a few days. We observed four decay chains among them two long ones comprising seven α decays and a spontaneous fission, both chains have similar properties (Fig. 1). Our data is largely consistent with previously reported data [3] on the decay chains assigned to ^{294}117. In addition to data from [3], a hitherto unknown α branch in ^{270}Db, which populated the new isotope ^{266}Lr, was identified.^{270}Db with a half-life of $1.0^{+1.9}_{-0.4}$ h is the most long-lived α-decaying nucleus above No (Z = 102). The decay chain members from ^{290}115 to ^{266}Lr all decay with $T_{1/2} \gtrsim 1$ s, which opens prospects for their chemical investigation and off-line studies.

We are grateful to GSI's ECR ion-source and UNILAC staff, and the Experimental Electronics Department for their continuous support of the experiment.

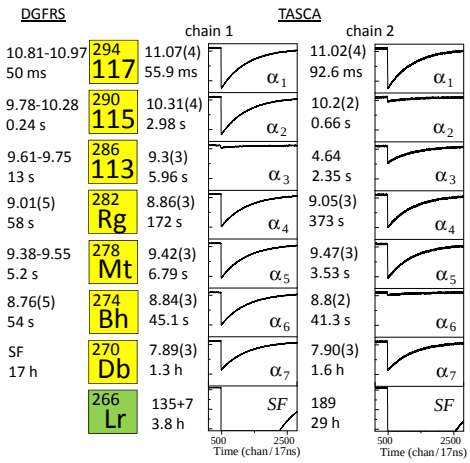

Figure 1: Decay chains assigned to ^{294}117 from this work (together with traces of members) and data from [3].

References

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* This work was financially supported in part by the German BMBF (05P12UMFNE), the Swedish Research Council, the U.S. Department of Energy by LLNL (DE-AC52-07NA27344), the Laboratory Directed Research and Development Program at LLNL (11-ERD-011) and the Helmholtz Institute Mainz. This work was co-sponsored by the Office of Science, U.S. Department of Energy, and supported under U.S. DOE grants No. DE-AC05-00OR22725.

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